Modern Concepts of Cardiovascular Disease

Published monthly by the AMERICAN HEART ASSOCIATION

50 WEST 50TH STREET, NEW YORK, N. Y.

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Vol. VI | February, 1937 | No. 2

THE CARDIAC CRIPPLE IN INDUSTRY

This is a problem which is complicated by two independent and generally conflicting desiderata — the interest of the patient and the interest of employers and others.

The interest of the patient calls for the best possible understanding of his condition, from this the optimal conception of his capacity and safety in various kinds of work, and then his placement in the most suitable employment. Rules of thumb, cross referring from pathological heart conditions to kinds of work permissible, would be convenient, but would also be unreliable. The same would be true of a rigid classification based on functional tests. The need is for a broad and balanced view of all possible elements in the individual situation: the heart lesion (and if originally infectious, the liability to reinfection), the age, habitus, general bodily condition, nervous-mental constitution, training, and even the predilections of the patient; and the kind and hours of work, ease of travel to and from work, climate and altitude, and opportunities for proper nourishment, sleep, recreation — and equanimity.

Active infection of the heart usually precludes any recommendation of employment; and it should be assumed to exist at least for several months following the fever or other obvious clinical manifestations of rheumatic fever, chorea, or other infection known or presumed to have involved the heart. And beyond this period of convalescence the prudent physician, knowing the protracted and insidious habit of the infection, will commend to the young person with rheumatic heart disease only such work as contributes do or at least is consistent with maintenance of the best possible condition of the body to resist it. In lues the general bodily condition, though important to maintain, is not the chief therapeutic objective; and active cardiovascular syphilis is compatible with suitable work during the period of treatment if liberal cardiac reserve strength is present.

When active infection is not an issue, *the fitness of the heart should be judged by an appraisal of the present virtues and probable future of the myocardium* — the stability of its mechanism of beat, the adequacy of its blood supply, and its margin of ability to carry peak loads safely with existing peripheral, valvular or other handicap.

Overload—Hypertrophy—Dilatation—Sequence. This is the gradual progress of the handicapped myocardium toward congestive failure. Contrary to a now prevalent notion, accurate knowledge of valve lesions is important, indeed is prerequisite to a full understanding of the myocardium. Illustration: A young man with healed rheumatic endocarditis, moderate cardiac enlargement, regular heart rhythm, and ability to climb stairs comfortably. If he has exclusively or predominantly mitral disease — let us say, insufficiency and beginning stenosis — the outlook is for slowly advancing stenosis, eventual paroxysmal or continuous atrial fibrillation, and, without adequate precautions, ultimately a zigzag downward course of lapses into and partial recoveries from congestive failure. Meantime his cardiac reserve can be safeguarded by a relatively simple prescription of employment — to avoid exercise which causes any dyspnea; for in his case the right ventricle carries the extra load (at the other end of the pulmonary circuit), and its embarrassment is immediately reflected in engorgement of lung vessels and commensurate diminution of air space. If, however, his valve lesion is exclusively or predominantly aortic, the outlook without intelligent management is for gradual increase in heart size with little or no discomfort and considerable tolerance for exercise until the ultimate, and then often irremediable, failure. To give him the same simple injunction, "avoid exercise which causes hard breathing," betrays a deplorable misconception of his myocardial situation; for his pulmonary circuit, protected by a competent mitral valve, is likely not to be much engorged until his left ventricle, greatly hypertrophied, has expended its reserve and dilates beyond its ability to recuperate. His exercise never should be strenuous, never more than mildly fatiguing. Prior to the onset of incipient failure (when almost any employment would be hazardous) the best single guide for his work prescription is the size of the heart; but this should be viewed in its relation to the duration of the valvulitis, the severity of the lesion (character of aortic second sound and peripheral phenomena), the age, build and previous activities of the patient.

In varying degree similar concepts of myocardial situation apply to other overloads which tend to advance or retard the appearance of dyspnea. Like mitral stenosis, pulmonary emphysema by a somewhat different mechanism gives an early signal of embarrassment of the right ventricle. Like aortic disease, hyperpiesis, coarctation of the aorta, thyrotoxicosis and arteriovenous aneurysm overwork the left ventricle and do not induce much dyspnea until it is far advanced in the hypertrophy-dilatation sequence. Pericardial adhesions and combinations of valvular or other handicaps usually present less

clearly differentiated relationships between dyspnea and the hypertrophy-dilatation sequence; but in estimating a patient's position in this sequence, i.e., his cardiac reserve and his optimal exercise, the heart size is always of great importance.

Myocardial Nutrition Deficit. To illustrate further the importance of studying valve condition: If our hypothetical patient is middle aged when he begins to experience cardiac symptoms, and we then find aortic insufficiency exclusively, we should realize that in all probability he has syphilis (regardless of history and Wassermann test), and that lesions around the valve may be encroaching on the mouths of the coronary arteries. Here a view of the myocardial situation limited to the hypertrophy-dilatation sequence is likely to be disastrously inadequate. More important is a conception of the threat to heart muscle nutrition, the doubtful possibility that antisyphilitic treatment will preserve it, and meantime the danger of an irreversible downward course, of syncopal attacks, of angina or sudden death from block, ventricular fibrillation or other disorder of heart-beat mechanism.

Coronary sclerosis advances insidiously, often to the danger point before it can be detected even by electrocardiography. Mild substernal distress with effort or a little nocturnal dyspnea are common early indications. Fully developed angina pectoris need not be discussed here, except to urge meticulous history-taking as superior to all other forms of examination — not only for diagnosis but also and especially for guidance in prescribing work. Muscular effort or mental excitement, independently or in relation to meals, temperature, hour of the day, etc., and anything that causes attacks must be avoided. Individualized advice is essential. The same is true after recovery from acute coronary occlusion. Beginning after sufficient time for firm scarring of the infarct, exercise may be gradually and cautiously increased. If the heart is not enlarged and gives no indication of embarrassment, heavy work sometimes can be resumed with impunity, although as a rule slow or stop signals appear long before this point is reached. Recurrence is common with or without work.

All persons with myocardial nutrition deficit, either absolute (as in acute coronary occlusion), relative (as in effort-induced angina), or potential (as in aortic syphilis which threatens the coronary mouths) are liable to syncope or sudden death through ventricular fibrillation or other abnormal beat mechanism. The danger diminishes as time elapses after a coronary accident or after the beginning of successful antisyphilitic treatment; but it is never quite absent, and requires careful consideration in the case of would-be chauffeurs, railway engineers and many others. And, (of course, *cerebral nutrition deficit* also should be remembered — the vascular accidents, transient vertigo, or simple blank moments common with high blood pressure, postural syncope with low pressure, reflex syncope, etc.

Myocarditis. True infection of heart muscle, either acute or chronic, and *myocardial fibrosis* or other forms of degeneration are usually advanced when clinically recognizable and require much conservatism in prescribing work. With low reserve power and poor material for building reserves, compensation is easily broken and hard to restore. The graver forms of abnormal beat mechanism are common, and may induce syncopal attacks with special hazards to the patient, to others and to property. The history of such attacks, objective evidence of muscle damage, (especially of the conduction system), pain, dyspnea or exhaustion with little provocation, heart enlargement, and congestive phenomena are important data, in varying degrees and combinations contributing to sound judgment about employment possibilities.

Masquerade Heart Disease. Inconsequential systolic murmurs still bar the way of many applicants for employment (and such rejections too often inflict further and more serious injury by implanting anxiety neurosis). To some extent the same is true of simple ventricular ectopic beats and other benign arrhythmias. Paroxysmal tachycardia and even atrial fibrillation may exist without demonstrable structural heart disease and without important reduction in cardiac efficiency. In general, while systolic murmurs and arrhythmias certainly cannot be ignored, they should take second place in the mind of the examiner; and for practical purposes he should pass as normal many hearts with these peculiarities, if other and more important data warrant it, especially the size of the heart and comfortable tolerance of exercise.

But tolerance of exercise requires discriminating interpretation. It may be much reduced without real heart disease, as in anemia, respiratory diseases, certain glandular disturbances, fatigue states, etc. Judgment then should be based upon the underlying condition rather than upon the heart, which acts merely as spokesman. Patients with neurocirculatory asthenia may be quite unfit for much exertion; but for them to realize that the necessary exercise restriction is designed for nervous comfort rather than cardiac safety is decidedly to their advantage and that of their work.

The interest of employers calls for efficient and safe service. But efficiency is not merely the ability to do certain work. Speed, maintained through regular working hours, and freedom from much sick-leave are usually required. And safety — that is not simply immunity from syncopal attacks for machine and transportation operatives and the like. Important (and often astonishingly neglected) as this is, it is less in the minds of many employers than their own immunity from penalties under the industrial accident laws. The administration of these laws often gives employees advantages far beyond equitable compensation for bona fide industrial injuries. A competent machinist with mitral stenosis may be crippled rather suddenly by the onset of atrial fibrillation. The chances are that some very ordinary act in his work will be blamed for it, that his attorney will find medical testimony to support a claim, and that the man will retire for an indefinite time at the expense of the employer. Or an aneurysm bursts in the act of lifting a typewriter; the lift has no important effect on the duration of the man's life — merely a "last straw" in the causative chain of events — and yet the widow receives an award, the same award as if her husband had been well and had been blown to bits by a boiler explosion. All very good for this particular machinist and this widow, but hard on the next applicant for employment with mitral stenosis or aneurysm. Physically and otherwise he may be well qualified for the job he seeks. He may be anxious to assume all risk incident to his disease. Will his signed waiver protect the employer? Very doubtfully so, advise the lawyers. Can the employer protect himself by insurance? Yes, but eventually more "accidents" will bring higher premiums.

And finally, opportunity for the cardiac cripple is often restricted by fellow workers. Their hospital association may be burdened by expense if he is employed. Even the old employee may feel the pinch of the group. A locomotive engineer recovers well after coronary thrombosis, but cannot safely run his engine again. He is qualified for clerical work and the railway management would like to give it to him, but is restrained by the clerks' union, who will brook no trespassing on their seniority.

The problem of employment for cardiac cripples is expanding in both its parts. With longer average life, degenerative diseases increase the number of cripples; and with present social and economic trends their opportunities are more and more curtailed. The medical part of the problem has received much attention, the social-economic part very little. The latter involves a complicated web of group forces opposed to the interest of the cardiac patient, and will require collective action for his relief.

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